



**UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/285,986	04/05/99	CHEU	S TSMC98-403

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EXAMINER

BEREZNY, N

ART UNIT

PAPER NUMBER

2813

DATE MAILED:

04/14/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/285,986	Applicant(s) CHEU ET AL.	
	Examiner Nema O Berezny	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☒ Claim(s) 1,8 and 20 is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 April 1999 is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
 1. ☐ received.
 2. ☐ received in Application No. (Series Code / Serial Number) _____.
 3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- | | |
|---|--|
| 14) <input type="checkbox"/> Notice of References Cited (PTO-892) | 17) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 15) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 18) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 16) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 19) <input type="checkbox"/> Other: |

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DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Reference #10 in Figs.8 and 9. Correction is required.

Specification

The disclosure is objected to because of the following informalities: on page 16 lines 13-14, after "top layer metal for the," delete "interconnecting lines" and insert – bond pad—thereto.

On page 16 line 15, after "metal for the," delete "bond pad" and insert – interconnecting lines-- thereto.

On page 17 line 5, after "Plasma Enhanced," delete " Si_3Ni_4 " and insert – Si_3N_4 —thereto.

On page 18 and 19 lines 22 and 12 respectively, delete " SiN_3 " and insert – Si_3N_4 —thereto.

Appropriate correction is required.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claims 1-4, 8, 16-18, 20-23 and 29 contain subject matter

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which is not disclosed in the specification. Disclosure of said subject matter in the specification is required.

Claim Objections

Claim 1 is objected to because of the following informalities: on line 3 after "Providing top," delete "layer" and insert --level-- thereto. Appropriate correction is required.

Claims 8 and 20 are objected to because of the following informalities: on line 3 and on line 24 respectively, after "9.5 um," delete --Angstrom-- therefrom. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 13 recites the limitation "said first and said second passivation layer" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claims 17 and 18 recite the limitation "said top level interconnecting metal" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 recites the limitations "said top level metal interconnecting lines," "said top level metal," and "the intra-level dielectric" in lines 17-18, 18, and 19 respectively. There is insufficient antecedent basis for this limitation in the claim.

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Claims 19 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. There are two curing cycles disclosed in instant application. One curing cycle occurs after removal of unexposed polyimide, which consists of curing at 350 degrees C for 120 minutes (spec. p.18 lines 14-17). The second curing cycle occurs after etching the first and second passivation layers, which consists of curing at 350 degrees C in a nitrogen gas environment for 20 hours and a pressure of 760 Torr (spec. p.20 lines 12-14). Claims 19 and 30 include operating parameters from both curing cycles, and it is unclear as to which curing cycle is being claimed. In addition, said curing step of independent claims 1 and 20 could be interpreted as occurring either before or after said patterning and etching said passivation layer step.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

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Claims 1, 2, 3, 4, 8, 9, 10, 11, 13, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 28, 29, and 30 are directed to the same invention as that of claims (1, 6, and 8), 14, 2, (3 and 16), 7, 1, 1, 8, 1, 1, 1, 1, 9, (1, 6, 7, and 8), 14, 2, (3 and 16), 1, 1, 1, 1, and 9, respectively of commonly assigned U.S. Patent No. 5,807,787. The issue of priority under 35 U.S.C. 102(g) and possibly 35 U.S.C. 102(f) of this single invention must be resolved.

Since the Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP § 2302), the assignee is required to state which entity is the prior inventor of the conflicting subject matter. A terminal disclaimer has no effect in this situation since the basis for refusing more than one patent is priority of invention under 35 U.S.C. 102(f) or (g) and not an extension of monopoly.

Failure to comply with this requirement will result in a holding of abandonment of this application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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Claims 1-5, 8-11, 13, 16-26, and 28-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Fu (5,807,787). Fu discloses providing interconnecting lines and bond pads of aluminum or aluminum/copper alloy at a thickness of 4000 to 8000 Angstrom on a silicon dioxide insulating film overlying a semiconductor substrate in which circuit elements are formed, being separated by intra-layer dielectric; depositing a first and second passivation layer, comprising plasma enhanced oxide of about 2000 Angstrom and a plasma enhanced silicon nitride of about 7000 Angstrom, respectively; depositing a layer of photosensitive polyimide at a thickness of 5.0 to 9.5 micron over said passivation layers; patterning and etching said polyimide over said bond pads; patterning and etching said passivation layers to expose said bond pads; and curing and cross-linking said polyimide layer in a nitrogen gas ambient between 300 and 400 degrees C for 1.5 to 2.5 hours, and UV exposing portions of said polyimide through a mask while protecting portions overlying said bond pads, then dissolving said unexposed polyimide portions (claims 1-9, col.5 lines 14-24).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 12 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu (5,807,787) in view of Yamamoto (5,013,689). Fu discloses providing interconnecting lines and bond pads of aluminum or aluminum/copper alloy at a thickness of 4000 to 8000 Angstrom on a silicon dioxide insulating film overlying a semiconductor substrate in which circuit elements are formed, being separated by intra-layer dielectric; depositing a first and second passivation layer, comprising plasma enhanced oxide of about 2000 Angstrom and a plasma enhanced silicon nitride of about 7000 Angstrom, respectively; depositing a layer of photosensitive polyimide at a thickness of 5.0 to 9.5 micron over said passivation layers; patterning and etching said polyimide over said bond pads; patterning and etching said passivation layers to expose said bond pads; and curing and cross-linking said polyimide layer in a nitrogen gas ambient between 300 and 400 degrees C for 1.5 to 2.5 hours, and UV exposing portions of said polyimide through a mask while protecting portions overlying said bond pads, then dissolving said unexposed polyimide portions (claims 1-9, col.5 lines 14-24). However, Fu does not disclose leaving in place the remaining portions of polyimide after said patterning and etching said polyimide step. Yamamoto discloses forming bonding pad windows through a polyimide layer, and leaving the remaining polyimide in place upon the substrate (claims 1, 4). Therefore, it would have been obvious to a person skilled in the art at the time of the invention to use the remaining polyimide of Yamamoto with the method of forming passivation layers of Fu. The polyimide layer of

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Yamamoto has the dual purpose of forming a mask for the bond pads, and functioning as a passivation layer to increase productivity, reliability, and yields (col.2 lines 52-59).

Claims 6, 7, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu (5,807,787) in view of conventional or obvious modifications. Fu discloses providing interconnecting lines and bond pads of aluminum or aluminum/copper alloy at a thickness of 4000 to 8000 Angstrom on a silicon dioxide insulating film overlying a semiconductor substrate in which circuit elements are formed, being separated by intra-layer dielectric; depositing a first and second passivation layer, comprising plasma enhanced oxide of about 2000 Angstrom and a plasma enhanced silicon nitride of about 7000 Angstrom, respectively; depositing a layer of photosensitive polyimide at a thickness of 5.0 to 9.5 micron over said passivation layers; patterning and etching said polyimide over said bond pads; patterning and etching said passivation layers to expose said bond pads; and curing and cross-linking said polyimide layer in a nitrogen gas ambient between 300 and 400 degrees C for 1.5 to 2.5 hours, and UV exposing portions of said polyimide through a mask while protecting portions overlying said bond pads, then dissolving said unexposed polyimide portions (claims 1-9, col.5 lines 14-24). However, Fu does not disclose specific operating parameters of PECVD of the first and second passivation layers at a temperature of 350 to 450 degrees C with 2.0 to 2.8 Torr pressure and 8 to 12 seconds, or etching parameters for the first passivation layer of Ar/CF₄ etchant, 120 to 160 degrees C, a pressure of 0.30 to 0.40 Torr and a time of 33 to 39 seconds, and etching parameters for the second passivation

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layer of He/NF₃ etchant, a temperature of 80 to 100 degrees C, a pressure of 1.20 to 1.30 Torr, and a time of 20 to 30 seconds. Said operating parameters for said method steps have been conventionally practiced and would have been an obvious embodiment to those skilled in the art.

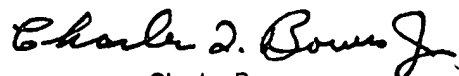
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nema O Berezny whose telephone number is (703) 305-3445. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, Jr. can be reached on (703) 308-2417. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

NB
April 13, 2000



Charles Bowers
Supervisory Patent Examiner
Technology Center 2800